Ornamental Plant Germplasm Center

OPGC Quarterly Newsletter
Spring 2006

In This Issue:

Our mission is to conserve the world's wealth of flower diversity to bring happiness and health to humankind.

Director's Introduction

This issue covers a wide range of recent activities going on at the Ornamental Plant Germplasm Center (OPGC), including a report on the *Anthurium* germplasm collection from our cooperators at the University of Hawaii. These *Anthurium* and several of the tropical plant germplasm accessions have been transferred to the USDA National Germplasm Repository in Miami, Florida, and will be distributed from there as indicated in more detail in this newsletter. This transfer is based on the recommendation from the recent external review of the OPGC by the USDA. The review team consisted of members from the Agricultural Research Service of the USDA, universities, the floriculture industry, and botanic gardens.

Dr Tay in the OPGC greenhouse.

Another important development is the backing up of seed of 108 accessions at the National Center for Genetic Resources Preservation (NCGRP) in Fort Collins, Colorado, for long-term storage. Read more about this in this issue. The Center continues to be proactive in its staff development program where staff members participate in scientific meetings and attend relevant training to ensure work safety and efficiency. Two of the stories describe these activities.

We continue to improve our genebank and research facilities, and in this issue there is a story on upgrading our thermogradient table to allow germination research with light treatment.

I would like to take this opportunity to inform you that our 2005 Annual Report is completed and it is posted at our web site at: http://opgc.osu.edu/section.php?id=15.

Finally, if you have suggestions and ideas on how we can collaborate, please write to me at tay.9@osu.edu. Thank you again.

David Tay, Ph.D.

Director

Ohio Botanical Symposium Looks at Native, Rare Plants

By Susan Stieve

Many OPGC staff and students were able to attend the all-day 6th Annual Ohio Botanical Symposium on Friday, March 31, in Columbus. Staff members included Russell Eckley, Jennifer Ehrenberger, Art Wells, and Susan Stieve. Tim Fleischer and Brian Thomason, OPGC student workers and horticulture and crop science undergraduates, were also part of more than 275 people in attendance. The OPGC display was set up for publicity, and we distributed informational pamphlets and bookmarks.

Presentations included a welcome from Ohio's First Lady, Mrs. Hope Taft, who discussed how native Ohio plant species are displayed at the Governor's Residence and Heritage Garden in nearby Bexley, Ohio. Landscape designers have replicated the major ecosystems of Ohio to show the diversity and special qualities of plants from prairies, bogs, the Allegheny plateau, Appalachian hills, woodlands, sand dunes, and meadows.

Greg Schneider, Ohio Division of Natural Areas and Preserves, presented the best plant finds of 2005, including rare and endangered species as well as extirpated species that were previously presumed to be extinct in Ohio. John Freudenstein, of the Ohio State University Museum of Biological Diversity, discussed guidelines for the taxonomic reclassification of plants, including molecular research that leads to a better understanding of the evolutionary relationships of plants.

Fred Case, author of the book on *Trilliums*, published by Timber Press in 1997, was the keynote speaker and discussed *Trillium* species native to North America. Other presentations included the preservation of biological diversity at the Arc of Appalachia, including the Highlands Nature Sanctuary, and a discussion of vernal pools. The Arc of Appalachia is a 90-mile crescent of land located where the Appalachian foothills meet the western glaciated plains of southern Ohio.

The symposium provided an informative day of presentations and networking with professional and amateur botanists from Ohio and adjoining states, and a great way to get enthusiastic about spring.

Tropical Transfer Sends Accessions South

By Jennifer Ehrenberger

In the recent external review of our program, it was decided that the OPGC would transfer our tropical germplasm accessions, including *Adenia*, *Anthurium*, *Dieffenbachia*, *Dovyalis*, *Passiflora*, *Philodendron*, *Neomarica*, and *Spathiphyllum*, to the National Germplasm Repository in Miami, Florida.

The Review Committee decided on this transfer since the plant material will be maintained vegetatively and is better suited for a germplasm repository in a warmer climate. This plant material filled significant greenhouse space here at the OPGC, whereas it can be grown outdoors in a shade house in Miami.

Researchers requesting this germplasm should now contact Tomas Ayala-Silva at tasilva@saa.ars.usda.gov for this valuable germplasm. ■

Jennifer Ehrenberger, clonal crop curator, prepares tropical plants for transfer to Miami.

Anthurium Germplasm from Hawaii Has Rich History

Heather Hodgin, Dr. Adelheid Kuehnle, and Dr. Tessie Amore
Department of Tropical Plant and Soil Sciences, University of Hawaii

In 1889 the first *Anthurium* species was imported to Hawaii. Since then *Anthurium* has grown to be the most important cut flower crop in Hawaii. The grace and durability of the plant and its exotic long-lasting flower make it a rich and beautiful part of our history as well as our future. *Anthurium* is also a priority for conservation in the USDA National Plant Germplasm System as identified by the Herbaceous Ornamental Plant Germplasm Committee.

The University of Hawaii has been studying and collecting this dynamic genus for more than 50 years. An important part of our mission is to develop new disease-resistant, fragrant, and other novel varieties for the growers in our state. Part of our effort to accomplish this mission over the years has been the development of a species collection for infusion of good genetics back into plants suitable for commercial production. We have collected more than 300 *Anthurium* species through early explorations of Panama and donations from colleagues and hobbyists.

Unfortunately our collection is under constant threat. Hawaii is definitely a tropical paradise, but with the good must come the bad, and our locale sits in the path of hurricanes, floods, pests, and disease. To avoid the loss of this precious material, we have undertaken the establishment of a tissue-culture germplasm bank of *Anthurium* at the University of Hawaii.

Over the past few years we have been making pollinations and collecting berries from the species. After sterilizing the berries, we extract the seeds and place them in liquid or solid media containing sucrose, coconut water, and vitamins. Once the seeds germinate and develop at least two leaves, they are transferred to a storage vessel appropriate for long- term growth.

In addition to the collection of berries, we have been exploring alternative methods for establishment of these important species in tissue culture. This is necessary because not all species will produce berries under the conditions we can provide. Our explorations have focused on the tissue culture of leaves. Through the manipulation of hormones, we can initiate callus (cells that can become different plant organs, such as shoots and roots). Once callus is initiated, we add different hormones to the media mix to develop shoots and eventually plantlets.

It is our good fortune to be able to share the material we have placed in tissue culture, including 14 different *Anthurium* species, with the National Plant Germplasm System. This germplasm will be maintained at the National Germplasm Repository in Miami, Florida, and be made available for distribution to researchers. We look forward to a future filled with beautiful flowers rich in history. ■

A. bakeri Hook f.

A. folsomianum Croat

A. garagaranum Standl.

A. gracile (Rudge) Schott

A. sanctifidense Croat

A. jefense Croat

A. pallidiflorum Engl.

A. supianum Engl.

A. trinerve Miq.

Anthurium species established in tissue culture and in place at the National Plant Germplasm System.
(Photographs courtesy of Dr. Haruyuki Kamemoto.)

Developing seeds of *A. folsomianum* five weeks after initial placement in liquid medium (left) and *Anthurium* plantlets growing in liquid medium (right).

Anthurium leaf tissue developing callus (left) and *Anthurium* plantlets growing in solid medium (right).

Research Assistants Earn Pesticide Recertification

By Art Wells

OPGC Research Assistants Eric Renze and Art Wells earned pesticide recertification in the core, greenhouse, and ornamental sections. They earned all of the credits necessary for license recertification while attending the 2005-2006 Recertification Conference for Ohio Pesticide Commercial Applicators. This one-day conference was held February 23, 2006, at the Columbus Convention Center, and was sponsored by The Ohio State University and the Ohio Department of Agriculture.

Sessions were offered on a variety of topics including basic pesticide information including new regulations, greenhouse, ornamental, turf, and general insects, as well as weeds of ornamental plants. Safety was a common thread running through the day's material.

Ohio State Extension Entomologist Dr. Luis Cañas gave a particularly helpful presentation entitled Insect Management Update for Greenhouses. Included was an update on the status of the silverleaf whitefly biotype Q, which has developed resistance to the popular neonicotinoid insecticide products and some insect growth regulators.

This biotype does not have unique visible characteristics and requires DNA analysis to determine its identity. This biotype has been found in 15 states including Indiana, Kentucky, Michigan, and Pennsylvania; sufficient sampling has not been done to determine whether it is present in Ohio. Effective and innovative control strategies will be essential in managing this emerging pest problem.

Close-up of a fungus gnat.

Cultural practices, natural enemies, and chemical treatment strategies were key topics covered in the greenhouse session. Dr. Cañas presented the results of recent product evaluations, displaying the relative efficacy of pesticides for a variety of insects.

Conferees were also presented with approaches to controlling aphids, fungus gnats, mealybugs, spider mites, thrips, and whiteflies. Strategies for making effective use of pesticide modes of action in rotation provided just a few of the many valuable insights obtained from this session.

Gaining this kind of instantly applicable information paired with an awareness of potential threats to plant health made the 2005-2006 Recertification Conference a valuable experience as we strive for a high standard of health for OPGC germplasm employees. ■

First Shipment of Seed Goes to NCGRP

By Eric Renze

The OPGC sent its first shipment of seed to the National Center for Genetic Resource Preservation (NCGRP) for long-term seed storage in February. The NCGRP is located in Fort Collins, Colorado. It was known as the National Seed Storage Laboratory (NSSL) prior to 2001.

One objective of the NCGRP is the long-term storage of the whole collection of plant germplasm for the National Plant Germplasm System (NPGS), of which the OPGC is a part. Seeds are either stored at -18° Celsius or under cryogenic (liquid nitrogen) conditions.

Our shipment to the NCGRP contained 108 accessions and consisted of seed successfully produced at the OPGC from 2002 through 2004, both in the greenhouse and at Ohio State University's Waterman Farm. Typically, 3,000 seeds were packaged in spear envelopes for each accession. Viability tests were performed to ensure the quality of seed being sent, with germination percentages ranging from 80 to 100%.

The long-term storage function of the NCGRP is a vital part of the NPGS and is an essential backup to the germplasm maintained at the OPGC. Currently 24% of accessions maintained at the OPGC are backed up. Our goal is to achieve 100% backup for increased security of the OPGC collection. ■

OPGC student worker Tim Copeland packages seed for NCGRP backup.

Thermogradient Table Maintains Optimum Germination Temperatures

By Russell Eckley

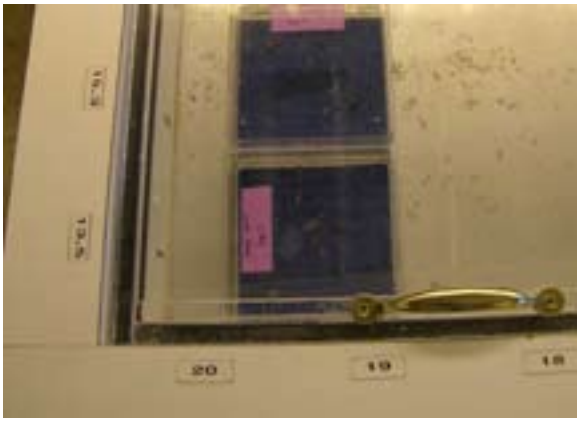
A thermogradient table is a computer-controlled scientific device that maintains specific surface temperatures across its width. The thermogradient table here at OPGC is used to determine optimum germination temperatures and to determine germination time with respect to temperature of the seeds contained in the table.

The seeds are placed into germination boxes and placed on the table surface across the manually set temperature gradient. Then wooden covers are put into place. The covers help maintain correct temperatures and also keep out light.

Graduate student Samuel Contreas recently required light to complete a series of germination tests. Simply leaving the covers off was not an option, as exact temperature control could no longer be assured, so new transparent table cover panels were required.

To have good isolation from the fluctuating ambient temperature around the table, it was decided that whatever material was used, it would be double pane to provide adequate insulation. Construction would also involve considerations of strength and durability as well.

Using acrylic fit the bill and allowed a very simple means for constructing the panels. Half-inch stock was used to separate the two panels for making the double panes. Once the assembly was clamped together, bonding fluid was applied with a syringe. The fluid did a good job of flowing into the joints through capillary action. Once in the joint, the bonding fluid liquefied the surfaces in the joints so that the adjacent surfaces became as one.



Close-up of new, clear top panels for the OPGC thermogradient table showing germination boxes in it.

Additional lighting was also installed. Four fluorescent light fixtures were attached to a Uni-Strut frame and suspended above the table. Prior to the next round of experiments, the light fixtures are to be altered as necessary to ensure even lighting across the table. ■

OPGC Thermogradient Table.

Close-up of new, clear top panels for the OPGC thermogradient table.

OPGC thermogradient table showing new, clear top panels that will allow light penetration and new fluorescent lighting hanging above.

Use of LabVIEW Software Promises to Save Time, Money

By Russell Eckley

LabVIEW, a software package available from National Instruments, has many functions that can be used to enable OPGC researchers to save a great deal of time and money in the future. The software was explained at an on-campus seminar on April 7.

LabView embraces the concept of Virtual Instrumentation. This means that functions often built into hardware are instead accomplished using software. LabVIEW uses a graphical programming environment that allows for the creation of virtual instruments. Instead of using stand-alone measuring equipment, an interface can be easily developed so that a laptop or desktop computer can act as any of a wide range of specific equipment. The only additional parts absolutely required are the sensors and an analog-to-digital converter, depending on the sensor type.

Another advantage is that a computer can not only mimic another device, it can also act as a large number of devices by sharing processor time. The computer can poll hundreds of individual sensors in a way that would, for instance, take as many data loggers. Simultaneously, the data can be stored, manipulated, processed, and used to make determinations about how the program will proceed.

Example of virtual digital display, dial input, and gage display generated by LabVIEW software.

LabView can create control functions in the software it generates, thereby allowing full automation in whatever application a user needs. Temperatures, humidity, and lighting can be controlled by the computer instead of traditional devices. Even motion control can be developed. This software would be a convenient way to program robotics.

My intention is to first use LabVIEW to help design new control systems for a pair of non-functioning incubators. I then plan on using the same design to convert two refrigerators for use as seed germinators. After that I will set up a dedicated computer for the thermogradient table and another for the tissue culture room to replace an obsolete data logger.

A long-term goal would be using machine vision to improve the function of the seed-sorting robot and to create a design for automated X-ray seed sorting. ■

Ornamental Plant Germplasm Center Endowment

The first specialized flower genebank in the world.

We invite you to be a part of the global effort to save our heirloom flowers by contributing to the OPGC Endowment. Please help ensure that our children and grandchildren will be able to enjoy the beauty of the flowers that our forebears left us.

Our mission is to conserve the world's wealth of flower diversity to bring happiness and health to humankind.

The OPGC benefits include:

- Preservation of unique genetic materials for present and future crops that are resistant to pests and diseases.
- Plants requiring fewer economic inputs; e.g., water, fertilizers, pesticides.
- Promotion of consumer product appeal through expansion of crop diversity in form, color, and fragrance.
- Biological activity for pharmaceutical, nutriceutical, agrochemical, and functional food uses.

All levels of contribution are welcome.

To contribute:

Please make check payable to:

The Ohio State University, Account # 645512

Please send your contribution to:

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